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and the definition should read: "a convex polyhedron whose faces are congruent regular polygons, the same number about each vertex."

Note.—The above reference to a polyhedral angle as a *configuration* suggests question 26. Is not the polyhedron also a *configuration,* and likewise all the other figures of solid geometry and of plane geometry? EDITOR.

CORRESPONDENCE.

TO THE EDITOR OF THE MONTHLY: In the review published in the March number of THE AMERICAN MATHEMATICAL MONTHLY, Professor E. J. Moulton writes, page 94,

> The "*and conversely*" is subsequently neglected without comment in deriving equations except in the case of the circle. . . . The proof of the "*and conversely*" for a straight line is as difficult as the direct, and the omission seems hardly excusable.

Since the proof of the "*and conversely*" for a straight line appears in the book under "review," Article 47, page 58, the reviewer is obviously in error. Moreover, the converse question for the several conics is considered in chapter VIII. That this question is "subsequently neglected" is therefore misleading.

As to the second criticism on "the equation of the locus," one may doubt the wisdom of introducing imaginary loci in an elementary text to the extent, at least, that would be necessary if one were to give a satisfactory explanation of the conditions under which $f = 0$ and $f \cdot \varphi = 0$ are equations of the same real locus.

L. WAYLAND DOWLING.

NOTES AND NEWS.

EDITED BY W. D. CAIRNS.

At Wellesley College Miss HELEN A. MERRILL has been promoted to a full professorship in mathematics. She is at present on leave of absence.

Professor F. A. SHERMAN, who in 1911 retired from the department of mathematics in Dartmouth College after forty years' service, died February twenty-fifth, 1915.

Professor THOMAS S. FISKE has been designated as administrative head of the Columbia University department of mathematics for two years beginning July 1, in the place of Professor Cassius J. Keyser, who retires at his own request.

The Mathematics Teacher has established a bureau for the use of institutions that need teachers and for the benefit of teachers of mathematics who wish to better their positions.

At the South Dakota State College, Assistant Professor CLIFFORD N. MILLS has organized a mathematical club for the undergraduate students. The members of the club are engineers and general science students majoring in mathematics.

Professor W. J. Hussey, of the department of astronomy in the University of Michigan, who has been for the past six months at La Plata University, has now returned to Ann Arbor.

School Science and Mathematics for April prints a valuable paper by C. W.

Newhall on "Recreations in secondary mathematics"; this gives both historical and topical treatment of the subject matter in a form which makes it quite accessible to the average high school teacher.

The address on "Graduate mathematical instruction for graduate students not intending to become mathematicians" delivered by Professor C. J. KEYSER before Section A of the American Association is printed in full in *Science* for March 26. His theme is the desirability and feasibility of organizing in every university a course such that an advanced student, while specializing in some other field, may yet gain a general knowledge of mathematical problems and processes.

The mathematics section of the Michigan Schoolmasters' Club met in Ann Arbor, April 1, 2 and 3. The program consisted of short discussions of practical phases of the teaching of high school mathematics, among which were "Practical applications of high school mathematics" and "Correlation between mathematics and other branches, and correlation of the various mathematical disciplines."

The Annual Conference of high school teachers in Kansas with the State University was held at Lawrence on March 26, 27, 1915. The leading paper at the mathematics section was given by Professor H. E. SLAUGHT, of the University of Chicago, on the topic: "Retrospect and Prospect in High School Mathematics." There was also an informal meeting of a dozen teachers of college mathematics, who were anxious to discuss matters of interest in the collegiate field.

The latest bulletin from the United States Bureau of Education on "Curricula in Mathematics" is a comparison of courses in the countries represented in the International Commission on the teaching of mathematics. The bulletin was prepared by J. C. Brown, of Teachers College, with the editorial coöperation of the American members of the commission.

The spring meeting of the Chicago Section of the American Mathematical Society was held at the University of Chicago on April 2, 3, 1915. About seventy-five were in attendance upon the various sessions, including fifty-three members of the Society. There were twenty-seven papers presented, besides a report by Professor E. H. Moore, a former chairman of the Section, on "Integral equations in general analysis." A specially enjoyable feature of these meetings is the opportunity for social intercourse between the sessions and at the dinner on the evening of the first day, where many matters of mathematical interest are talked over informally.

In *School and Society* for March 27, 1915, Professor G. A. MILLER has an interesting article on "Shamelessness in regard to mathematical ignorance."

Superintendent BEN BLEWETT of St. Louis gave before the National Council of Education at its recent Cincinnati meeting, an address of appreciation of the late James M. Greenwood, whose interest in mathematics was noted in the February MONTHLY. A significant sentence in this address bears eloquent testimony to the training power of mathematics and allied subjects which was so strongly manifest in his life: "Mathematics, logic, and philosophy sharpened an analytic mind which had singled them out as subjects of the greatest interest. Their influence on him was manifest in the comprehensive grasp and ordered marshalling of his thoughts, and in the clear and vigorous English in which he expressed them."

The University of Wisconsin, in coöperation with the University High School of Madison, has instituted a scheme for supervised observation work as a part of practice teaching. To avoid having ineffective teaching by beginners and nevertheless to give these proper training, they are enrolled as regular members of the class, sharing in all the recitations and other responsibilities of the pupils, but are detailed frequently to act as assistant teachers in various capacities. They must further report upon various problems of teaching as these arise, all such reports being discussed with them by the supervisors and recorded in the principal's office where they may be consulted by school superintendents seeking teachers.

The March number of *The Mathematics Teacher* contains the following four articles: (1) "The five Platonic bodies," by J. H. Weaver, in which he points out mutual relations of these bodies and of thirteen other solids studied by Archimedes, and argues that these were all derived by being whittled from the sphere; (2) "A study of the reliability of test questions," by G. G. Chambers, an account of preliminary work to establish non-geometrical tests for determining the results of geometry teaching on reasoning ability; (3) "Business arithmetic versus algebra in the high school," an address by G. H. Van Tuyl of the High School of Commerce, New York City, in support of the former, supplemented by a discussion from a different point of view by W. S. Schlauch; and (4) the report of the arithmetic committee of the Association of Teachers of Mathematics in the Middle States and Maryland. The spring meeting of this association was held at Hunter College, New York City, on April 17.

The *Mathematical Gazette* is presenting, in a form adapted to the use of school teachers, a series of articles by Professor W. W. ROUSE BALL on the world's great mathematicians. The following abstract of the article on Pythagoras in the January number will furnish some idea of the nature of this valuable series of biographical sketches.

To the critical historian it appears to be established that Pythagoras was born about 570 B.C., that through his father's trade relations he came into touch with philosophers of the Ionian School and later went to Egypt where, through favorable introductions, he secured admission to the College of Priests and mastered the secrets of their science and religion. Thence he went to Babylon, where he learned something of Persian and Indian thought at the very time, it may very well be, when Daniel of the Old Testament was living there. While it seems certain that he was influenced by the geometrical discoveries of the Ionian School, which included the earliest attempts to give general, rather than particular, proofs for geometrical propositions, he was more influenced by the systems of religion, politics, and philosophy which he found in Egypt and Babylon. He was indeed a moral teacher and philosopher preëminently, yet to him is due the organization of mathematics as a science, even the adoption of the word itself.

Ball's theory is that Pythagoras was led to the study of geometry and numbers through his researches in natural philosophy. His love for music brought him to his important study of vibrating strings and this theory in turn he naturally connected with the properties of numbers. From this starting point too he went on to develop very elaborately the connection between the properties of numbers and various recurrent phenomena, geometrical forms, the nine celestial bodies (the earth, the moon, the sun, the five planets then known, and the firmament), etc. Just because of this (to him) essential and universal interrelation, he organized and extended the previously known portion of what we call elementary geometry, he discovered and proved the existence of incommensurable quantities but treated these by geometrical methods, distrusting such demonstrations as rest on the possibility of making numerical measurements. He was particularly concerned with the development of the properties of integers, being certainly acquainted with triangular numbers, excessive, perfect, and defective numbers, amicable number pairs, arithmetic, geometric and harmonic series, etc. How fundamental in the mind of Pythagoras were number theory and geometry to a knowledge of higher learning, may be judged from this, that the *quadrivium*, composed of numbers absolute or Pythagorean arithmetic, numbers applied or music, magnitudes at rest or geometry, and magnitudes in motion or astronomy, formed his great scheme of liberal education preliminary to any further pursuit of culture and philosophy.

Because he let his imagination run away with him and his theories were mixed with fanciful speculations, which were often based on inferences rather than on exact observations, he and his school were subjected to severe criticism and mistrust both in ancient and in modern times; but it is now acknowledged that he initiated the brilliant era of Greek philosophy and science, and that, even though his political activity aroused much opposition in his lifetime, the loftiness of his aims and ideals gives him an unquestioned high place.

Errata.—The following errors have been discovered: Volume XXI, page 299, last line, $(-1)^k$ should be $(-1)^{k-1}$. Page 323, line 10, 1656 should be 1856. Page 333, line 7 down, delete the word "nine"; line 7 up, $x^9 - 2x^6 - x^3 + 1$ should be $x^9 - 2x^6 - x^3 - 1$; line 4 up, $(-1)^{13/9}$ should be $(-1)^{12/9}$. Page 334, line 18 down, $\gamma + 2C_2$ should be $\gamma + 1C_2$. Page 342, line 3 down, the fifth value should be 8 instead of 5. Volume XXII, page 68, line 13 down, $f''(x) = -e(2n-1)\pi$ should be $f''(x) = e^{-e(2n-1)\pi}$. Page 131, line 4, $\pi^3/12^3$ should be $\pi^3/12$.